The Management University of Africa

MUA

Sponsored by the Kenya Institute of Management

UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF MANAGEMENT AND LEADERSHIP/ BACHELOR OF COMMERCE

BML 103/ BCM 112: BUSINESS MATHEMATICS

DATE: ***4TH APRIL 2018***

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

QUESTION ONE

a) State any two methods used in constructing a simple index number

(4marks)

b) Consider the following two matrices A and B given below

$$A=\begin{bmatrix}2 & 4\\ 3 & 6\\ 1 & 8\end{bmatrix} \quad \text{and} \quad B=\begin{bmatrix}5 & 4\\ 2 & 4\\ 9 & 1\end{bmatrix}$$

Required:

i) Find A+2B **(2marks)**

ii) Determine A^T matrix and find the product A^TB **(4marks)**

c) Differentiate the function $y = x^3 - 12x^2 + 36x + 8$ **(2marks)**

d) Determine the value of x in the above c(i) function that constitutes the stationary points **(5marks)**

e) $\int 3Q^3 - \frac{Q^2}{5} + 5\ )\ dQ$ **(2marks)**

f) The following data represents age of ICT managers at nine different branches of Tecno Company.

24, 27, 24, 19, 30, 32, 38, 24, and 33

Determine

i) the mode ,

ii) median and

iii) mean **(4marks)**

g) Define the following terms

i. simple interest **(1mark)**

ii. compound interest **(1mark)**

QUESTION 2

a) solve for x given $\frac{x}{5-x} = \frac{2x+1}{5}$ **(6marks)**

b) $\int_{-1}^{2} (7x^2+6x-10)dx$ **(5marks)**

c) Explain any two rules of probability **(4marks)**

QUESTION 3

The following are systems of simultaneous equations. Use any matrix method to solve

$4x + y - 5z = 8$

$-2x + 3y + z = 12$

$3x - y + 4z = 5$ **(15marks)**

QUESTION 4

a) Kut a student from Nairobi University received an award of $300 from an NGO for good performance in high school exam having come from a remote part of Kenya. He invested it a bank at compounded interest rate of 6% p.a to get it back after two years as part of his university school fees scheme. What would be the future value after two years if it was compounded

i. Annually **(1mark)**

ii. Quarterly **(2marks)**

iii. Monthly **(2marks)**

b) Consider the annual prices and quantities for a given product for ABC

Products	2014		2015	
	Price(ksh)	Qunatity (bags)	Price(ksh)	Qunatity (bags)
maize	500	20	580	30
wheat	600	15	590	19
Rice	480	12	550	18

Required use the data to calculate Fishers Price index number **(10 marks)**

QUESTION 5

A survey conducted of 600 students at Africa Nazarene University produced the following results.

190 of the students read Daily Nation;

180 of the students read Standard newspaper;

500 read Magazines;

130 read Daily Nation and Standard newspaper;

110 read the Standard Newspaper and Magazines;

130 read Daily Nation and Magazines:

90 read all three.

Use the above information to answer the following question

a) Construct a Venn diagram to represent this information **(6marks)**

b) How many students read none of the publication? **(3marks)**

c) How many read magazines **(3marks)**

d) How many read Daily nation and the Standard Newspaper, but not Magazine. **(3marks)**

QUESTION 6

The following grouped data represents the percentage marks scored by 30 students in business mathematics exam

Marks	Number of students
10-19	1
20-29	2
30-39	2
40-49	4
50-59	5
60-69	7
70-79	6
80-89	3

Required:

a. Identify the modal class **(1mark)**

b. Construct a histogram for this data **(5marks)**

c. Compute for the grouped data

i. The mean **(4marks)**

ii. Standard deviation **(4marks)**

iii. Coefficient of Variation **(1mark)**

BML 103/ BCM 112 FORMULAS

Mean, $\bar{x} = \frac{\sum FX}{\sum F}$

$Z = \frac{\text{Mean - value}}{\text{Standard deviation}}$

Mode, $X_0 = L + \frac{F1}{} \times i$ or $\text{Mode} = L + \left(\frac{D_1}{D_1 + D_2}\right).c$

Median, $X_d = L + i\ (M - C)$ or $\text{Median} = L + \left(\frac{\frac{N}{2} - F_{m-1}}{f_m}\right).c$

Variance, $\delta^2 = \frac{\sum f\left[(X - \bar{x})^2\right]}{\sum f}$ or Variance, $S^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$

Standard deviation, $\delta = \sqrt{\frac{\sum f (X - \bar{x})^2}{\sum f}}$ or Standard deviation, $S = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$

$$CV = \frac{SD}{\text{Mean}} \times 100$$

Karl Pearson coefficient of Skewness, $SK = 3 \times \frac{(\text{mean - median})}{\text{Standard deviation}}$

Future value for simple interest, $S = P(1 + r\,n)$

Future value for compound interest, $S = P(1 + r)^n$

Laspeyres price index $L_P = \frac{\sum q_0 p_n}{\sum q_0 p_0} \times 100$ Laspeyres quantity index $L_Q = \frac{\sum p_0 q_n}{\sum p_0 q_0} \times 100$

Paasche price index $P_P = \frac{\sum q_n p_n}{\sum q_n p_0} \times 100$ Paasche quantity index $P_Q = \frac{\sum p_n q_n}{\sum p_n q_0} \times 100$

Fisher's price index $F_P = \sqrt{L_P \times P_P}$ Fisher's quantity index $F_Q = \sqrt{L_Q \times P_Q}$

Quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$